

(4) Fuel evaporative emissions. These requirements are described in 40 CFR part 86.

(c) The regulated heavy-duty vehicles are addressed in different groups as follows:

(1) For criteria pollutants, vehicles are regulated based on gross vehicle weight rating (GVWR), whether they are considered “spark-ignition” or “compression-ignition,” and whether they are first sold as complete or incomplete vehicles. These groupings apply as described in 40 CFR part 86.

(2) For greenhouse gas pollutants, vehicles are regulated in the following groups:

(i) Complete and certain incomplete vehicles at or below 14,000 pounds GVWR (see § 1037.104 for further specification). Certain provisions of 40 CFR part 86 apply for these vehicles; see § 1037.104(h) for a list of provisions in this part 1037 that also apply for these vehicles. These provisions may also be optionally applied to certain other vehicles, as described in § 1037.104.

(ii) Tractors above 26,000 pounds GVWR.

(iii) All other vehicles subject to standards under this part. These other vehicles are referred to as “vocational” vehicles.

§ 1037.102 Exhaust emission standards for NO_x, HC, PM, and CO.

See 40 CFR part 86 for the exhaust emission standards for NO_x, HC, PM, and CO that apply for heavy-duty vehicles.

§ 1037.104 Exhaust emission standards for CO₂, CH₄, and N₂O for heavy-duty vehicles at or below 14,000 pounds GVWR.

This section applies for heavy-duty vehicles at or below 14,000 pounds GVWR. See paragraph (f) of this section and § 1037.150 of this section for

provisions excluding certain vehicles from this section, and allowing other vehicles to be certified under this section.

(a) *Fleet-average CO₂ emission standards.* Fleet-average CO₂ emission standards apply for each manufacturer as follows:

(1) Calculate a work factor, WF, for each vehicle subconfiguration (or group of subconfigurations allowed under paragraph (a)(4) of this section), rounded to the nearest pound, using the following equation:

$$WF = 0.75 \times (GVWR - \text{Curb Weight} + \text{xwd}) + 0.25 \times (GCWR - GVWR)$$

Where:

xwd = 500 pounds if the vehicle has four-wheel drive or all-wheel drive; xwd = 0 pounds for all other vehicles.

(2) Using the appropriate work factor, calculate a target value for each vehicle subconfiguration (or group of subconfigurations allowed under paragraph (a)(4) of this section) you produce using one of the following equations, rounding to the nearest 0.1 g/mile:

(i) For spark-ignition vehicles: CO₂ Target (g/mile) = 0.0440 × WF + 339

(ii) For compression-ignition vehicles and vehicles that operate without engines (such as electric vehicles and fuel cell vehicles): CO₂ Target (g/mile) = 0.0416 × WF + 320

(3) Calculate a production-weighted average of the target values and round it to the nearest 0.1 g/mile. This is your fleet-average standard. All vehicles subject to the standards of this section form a single averaging set. Use the following equation to calculate your fleet-average standard from the target value for each vehicle subconfiguration (Target_{*i*}) and U.S.-directed production volume of each vehicle subconfiguration for the given model year (Volume_{*i*}):

$$\text{Fleet-Average Standard} = \frac{\sum [\text{Target}_i \times \text{Volume}_i]}{\sum [\text{Volume}_i]}$$

(4) You may group subconfigurations within a configuration together for

purposes of calculating your fleet-average standard as follows:

(i) You may group together sub-configurations that have the same equivalent test weight (ETW), GVWR, and GCWR. Calculate your work factor and target value assuming a curb weight equal to two times ETW minus GVWR.

(ii) You may group together other subconfigurations if you use the lowest target value calculated for any of the subconfigurations.

(b) *Production and in-use CO₂ standards.* Each vehicle you produce that is subject to the standards of this section has an “in-use” CO₂ standard that is calculated from your test result and that applies for selective enforcement audits and in-use testing. This in-use CO₂ standard for each vehicle is equal to the applicable deteriorated emission level multiplied by 1.10 and rounded to the nearest 0.1 g/mile.

(c) *N₂O and CH₄ standards.* Except as allowed under this paragraph (c), all vehicles subject to the standards of this section must comply with an N₂O standard of 0.05 g/mile and a CH₄ standard of 0.05 g/mile. You may specify CH₄ and/or N₂O alternate standards using CO₂ emission credits instead of these otherwise applicable emission standards for one or more test groups, consistent with the provisions of 40 CFR 86.1818. To do this, calculate the CH₄ and/or N₂O emission credits needed (negative credits) using the equation in this paragraph (c) based on the FEL(s) you specify for your vehicles during certification. You must adjust the calculated emissions by the global warming potential (GWP): GWP equals 25 for CH₄ and 298 for N₂O. This means you must use 25 Mg of positive CO₂ credits to offset 1 Mg of negative CH₄ credits and 298 Mg of positive CO₂ credits to offset 1 Mg of negative N₂O credits. Note that 40 CFR 86.1818–12(f) does not apply for vehicles subject to the standards of this section. Calculate credits using the following equation:

$$\text{CO}_2 \text{ Credits Needed (Mg)} = [(\text{FEL} - \text{Std}) \times (\text{U.S.-directed production volume}) \times (\text{Useful Life})] \times (\text{GWP}) \div 1,000,000$$

(d) *Compliance provisions.* Except as specified in this paragraph (d) or elsewhere in this section, the provisions of 40 CFR part 86, describing compliance with the greenhouse gas standards of 40 CFR part 86, subpart S, apply with re-

spect to the standards of paragraphs (a) through (c) of this section.

(1) The CO₂ standards of this section apply with respect to CO₂ emissions, not with respect to carbon-related exhaust emissions (CREE).

(2) Vehicles subject to the standards of this section are included in a single greenhouse gas averaging set separate from any averaging sets otherwise included in 40 CFR part 86.

(3) Special credit and incentive provisions related to flexible fuel vehicles and air conditioning in 40 CFR part 86 do not apply for vehicles subject to the standards of this section.

(4) The CO₂, N₂O, and CH₄ standards apply for a weighted average of the city (55%) and highway (45%) test cycle results as specified for light-duty vehicles in 40 CFR part 86, subpart S. Note that this differs from the way the criteria pollutant standards apply for heavy-duty vehicles.

(5) Apply an additive deterioration factor of zero to measured CO₂ emissions unless good engineering judgment indicates that emissions are likely to deteriorate in use. Use good engineering judgment to develop separate deterioration factors for N₂O and CH₄.

(6) Credits are calculated using the useful life value (in miles) in place of the “vehicle lifetime miles” specified in 40 CFR part 86, subpart S.

(7) Credits generated from hybrid vehicles with regenerative braking or from vehicles with other advanced technologies may be used to show compliance with any standards of this part or 40 CFR part 1036, subject to the service class restrictions in §1037.740. Include these vehicles in a separate fleet-average calculation (and exclude them from your conventional fleet-average calculation). You must first apply these advanced technology vehicle credits to any deficits for other vehicles in the averaging set before applying them to other averaging sets.

(8) The provisions of 40 CFR 86.1818 do not apply.

(9) Calculate your fleet-average emission rate consistent with good engineering judgment and the provisions of 40 CFR 86.1865. The following additional provisions apply:

(i) Unless we approve a lower number, you must test at least ten subconfigurations. If you produce more than 100 subconfigurations in a given model year, you must test at least ten percent of your subconfigurations. For purposes of this paragraph (d)(9)(i), count carryover tests, but do not include analytically derived CO₂ emission rates, data substitutions, or other untested allowances. We may approve a lower number of tests for manufacturers that have limited product offerings, or low sales volumes. Note that good engineering judgment and other provisions of this part may require you to test more subconfigurations than these minimum values.

(ii) The provisions of paragraph (g) of this section specify how you may use analytically derived CO₂ emission rates.

(iii) At least 90 percent of final production volume at the configuration level must be represented by test data (real, data substituted, or analytical).

(10) For dual fuel, multi-fuel, and flexible fuel vehicles, perform exhaust testing on each fuel type (for example, gasoline and E85).

(i) For your fleet-average calculations, use either the conventional-fueled CO₂ emission rate or a weighted average of your emission results as specified in 40 CFR 600.510–12(k) for light-duty trucks.

(ii) If you certify to an alternate standard for N₂O or CH₄ emissions, you may not exceed the alternate standard when tested on either fuel.

(11) Test your vehicles with an equivalent test weight based on its Adjusted Loaded Vehicle Weight (ALVW). Determine equivalent test weight from the ALVW as specified in 40 CFR 86.129, except that you may round values to the nearest 500 pound increment for ALVW above 14,000 pounds).

(12) The following definitions apply for purposes of this section:

(i) Configuration means a subclassification within a test group which is based on engine code, transmission type and gear ratios, final drive ratio, and other parameters which we designate. Note that this differs from the definition in 40 CFR 86.1803 because it excludes inertia weight class as a criterion.

(ii) Subconfiguration means a unique combination within a vehicle configuration (as defined in this paragraph (d)(12)) of equivalent test weight, road-load horsepower, and any other operational characteristics or parameters that we determine may significantly affect CO₂ emissions within a vehicle configuration.

(iii) The terms “complete vehicle” and “incomplete vehicle” have the meanings given for “complete heavy-duty vehicle” and “incomplete heavy-duty vehicle” in 40 CFR 86.1803.

(13) This paragraph (d)(13) applies for CO₂ reductions resulting from technologies that were not in common use before 2010 that are not reflected in the specified test procedures. We may allow you to generate emission credits consistent with the provisions of 40 CFR 86.1866–12(d). You do not need to provide justification for not using the 5-cycle methodology option.

(14) You must submit pre-model year reports before you submit your applications for certification for a given model year. Unless we specify otherwise, include the information specified for pre-model year reports in 49 CFR 535.8.

(e) *Useful life.* Your vehicles must meet the exhaust emission standards of this section throughout their full useful life, expressed in service miles or calendar years, whichever comes first. The useful life values for the standards of this section are those that apply for criteria pollutants under 40 CFR part 86.

(f) *Exclusion of vehicles not certified as complete vehicles.* The standards of this section apply for each vehicle that is chassis-certified with respect to criteria pollutants under 40 CFR part 86, subpart S. The standards of this section do not apply for other vehicles, except as noted in § 1037.150. Note that vehicles excluded under this paragraph (f) are not considered to be “subject to the standards of this section.” The vehicle standards and requirements of § 1037.105 apply for the excluded vehicles. The GHG standards of 40 CFR part 1036 also apply for engines used in these excluded vehicles. If you are not the engine manufacturer, you must notify the engine manufacturer that its engines are subject to 40 CFR part 1036

because you intend to use their engines in your excluded vehicles.

(g) *Analytically derived CO₂ emission rates (ADCs)*. This paragraph (g) describes an allowance to use estimated (*i.e.*, analytically derived) CO₂ emission rates based on baseline test data in-

stead of measured emission rates for calculating fleet-average emissions. Note that these ADCs are similar to ADFEs used for light-duty vehicles. Note also that F terms used in this paragraph (g) represent coefficients from the following road load equation:

$$\text{Force} = (\text{mass})(\text{acceleration}) = F0 + F1 \cdot (\text{velocity}) + F2 \cdot (\text{velocity})^2$$

(1) Except as specified in paragraph (g)(2) of this section, use the following equation to calculate the ADC of a new

vehicle from road load force coefficients (F0, F1, F2), axle ratio, and test weight:

$$ADC = CO2_{base} + 2.18 \cdot \Delta F0 + 37.4 \cdot \Delta F1 + 2257 \cdot \Delta F2 + 189 \cdot \Delta AR + 0.0222 \cdot \Delta ETW$$

Where:

ADC = Analytically derived combined city/highway CO₂ emission rate (g/mile) for a new vehicle.

CO_{2base} = Combined city/highway CO₂ emission rate (g/mile) of a baseline vehicle.

ΔF0 = F0 of the new vehicle—F0 of the baseline vehicle.

ΔF1 = F1 of the new vehicle—F1 of the baseline vehicle.

ΔF2 = F2 of the new vehicle—F2 of the baseline vehicle.

ΔAR = Axle ratio of the new vehicle—axle ratio of the baseline vehicle.

ΔETW = ETW of the new vehicle—ETW of the baseline vehicle.

(2) The purpose of this section is to accurately estimate CO₂ emission rates. You must apply the provisions of this section consistent with good engineering judgment. For example, do not use the equation in paragraph (g)(1) of this section where good engineering judgment indicates that it will not accurately estimate emissions. You may ask us to approve alternate equations that allow you to estimate emissions more accurately.

(3) You may select, without our prior approval, baseline test data that meet all the following criteria:

(i) Vehicles considered for selection for the baseline test must comply with all applicable emission standards in the model year associated with the ADC.

(ii) You must include in the pool of tests which will be considered for baseline selection all official tests of the

same or equivalent basic engine, transmission class, engine code, transmission code, engine horsepower, dynamometer drive wheels, and compression ratio as the ADC subconfiguration. Do not include tests in which emissions exceed any applicable standards.

(iii) Where necessary to minimize the CO₂ adjustment, you may supplement the pool with tests associated with worst-case engine or transmission codes and carryover or carry-across engine families. If you do, all the data that qualify for inclusion using the elected worst-case substitution (or carryover or carry-across) must be included in the pool as supplemental data (*i.e.*, individual test vehicles may not be selected for inclusion). You must also include the supplemental data in all subsequent pools, where applicable.

(iv) Tests previously used during the subject model year as baseline tests in ten other ADC subconfigurations must be eliminated from the pool. (v) Select the tested subconfiguration with the smallest absolute difference between the ADC and the test CO₂ emission rate for combined emissions. Use this as the baseline test for the target ADC subconfiguration.

(4) You may ask us to allow you use baseline test data not fully meeting the provisions of paragraph (g)(3) of this section.

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(5) Calculate the ADC rounded to the nearest 0.1 g/mile. The downward adjustment of ADC from the baseline is limited to ADC values 20 percent below the baseline emission rate (*i.e.*, baseline emission rate \times 0.80). The upward adjustment is not limited.

(6) You may not submit an ADC if an actual test has been run on the target subconfiguration during the certification process or on a development vehicle that is eligible to be declared as an emission-data vehicle.

(7) No more than 40 percent of the subconfigurations tested in your final CO₂ submission may be represented by ADCs.

(8) You must retain for five years the pool of tests, the vehicle description and tests chosen as the baseline and the basis for its selection, the target ADC subconfiguration, and the calculated emission rates. We may ask to see these records at any time.

(9) We may perform or order a confirmatory test of any subconfiguration covered by an ADC.

(10) Where we determine that you did not fully comply with the provisions of this paragraph (g), we may rescind the use of ADC data, require generation of actual test data, and require recalculation of your fleet-average emission rate.

(h) *Applicability of part 1037 provisions.* Except as specified in this section, the requirements of this part do not apply to vehicles certified to the standards of this section. The following provisions are the only provisions of this part that apply to vehicles certified under this section:

(1) The provisions of this section.

(2) [Reserved]

(3) The air conditioning standards in § 1037.115.

(4) The interim provisions of § 1037.150(a), (b), (c), (e)–(i), (l), and (m).

(5) The definitions of § 1037.801, to the extent such terms are used relative to vehicles subject to standards under this section.

§ 1037.105 Exhaust emission standards for CO₂ for vocational vehicles.

(a) The standards of this section apply for the following vehicles:

(1) Vehicles above 14,000 pounds GVWR and at or below 26,000 pounds

GVWR, but not certified to the vehicle standards § 1037.104.

(2) Vehicles above 26,000 pounds GVWR that are not tractors.

(3) Vocational tractors.

(4) Vehicles at or below 14,000 pounds GVWR that are excluded from the standards in § 1037.104 under § 1037.104 (f) or use engines certified under § 1037.150(m).

(b) The CO₂ standards of this section are given in Table 1 to this section. The provisions of § 1037.241 specify how to comply with these standards.

TABLE 1 TO § 1037.105—CO₂ STANDARDS FOR VOCATIONAL VEHICLES

GVWR (pounds)	CO ₂ standard (g/ton-mile) for model years 2014–2016	CO ₂ standard (g/ton-mile) for model year 2017 and later
GVWR ≤ 19,500	388	373
19,500 < GVWR ≤ 33,000	234	225
33,000 < GVWR	226	222

(c) No CH₄ or N₂O standards apply under this section. See 40 CFR part 1036 for CH₄ or N₂O standards that apply to engines used in these vehicles.

(d) You may generate or use emission credits under the ABT program as described in subpart H of this part. This requires that you specify a Family Emission Limit (FEL) for CO₂ for each vehicle subfamily. The FEL may not be less than the result of emission modeling from § 1037.520. These FELs serve as the emission standards for the vehicle subfamily instead of the standards specified in paragraph (b) of this section.

(e) Your vehicles must meet the exhaust emission standards of this section throughout their full useful life, expressed in service miles or calendar years, whichever comes first. The following useful life values apply for the standards of this section:

(1) 110,000 miles or 10 years, whichever comes first, for vehicles at or below 19,500 pounds GVWR.

(2) 185,000 miles or 10 years, whichever comes first, for vehicles above 19,500 pounds GVWR and at or below 33,000 pounds GVWR.

(3) 435,000 miles or 10 years, whichever comes first, for vehicles above 33,000 pounds GVWR.

(f) See § 1037.631 for provisions that exempt certain vehicles used in off-